NOTES ON AMERICAN WILLOWS. IV

SPECIES AND VARIETIES OF SECTION LONGIFOLIAE

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In my paper on Mexican willows (BOT. GAZ. 65:22. 1918) I have already dealt with some species of this well marked and entirely American section. In this article I intend to discuss all the members of this interesting group, which is, as M. S. BEBB (1891) and W. W. ROWLEE (1900) rightly stated, clearly defined from the other sections of the genus in both the New and the Old World. ANDERSSON (1858) was the first to recognize the close relationship of species like *S. sessilifolia* Nutt., *S. Hindsiana* Benth., and *S. taxifolia* Kth. to *S. longifolia* Muhl. Unfortunately he misunderstood most of the species described by NUTTALL, and therefore he did not give, even in 1868, a proper analysis of the forms of this section. In 1900 W. W. ROWLEE (Bull. Torr. Bot. Club 27:247) made an attempt to rehabilitate all of NUTTALL'S species, and described several new species and varieties from the southwest, especially from California. His interpretation of NUTTALL'S species, however, is not free from grave errors owing to the lack of sufficient type material. Later C. V. PIPER studied those types of NUTTALL which are preserved in the British Museum, and communicated his notes to C. R. BALL, who in 1915 (BOT. GAZ. 60:49) was able to identify *S. sessilifolia* and *S. fluviatilis* Nutt. I have not seen the types in the British Museum, but I have photographs of NUTTALL'S specimens of *S. exigua*, *S. macrostachya*, and *S. melanopsis* from the Herbarium of the Academy of Science at Philadelphia. Besides this I have also examined a few of NUTTALL'S willows at the Gray Herbarium, which also contains some cotypes of forms described by ANDERSSON. Photographs and fragments of ANDERSSON'S types from the Hookerian Herbarium at Kew are now in possession of the Arnold Arboretum, and Professor W. W. ROWLEE kindly sent me the types of his new species and forms so far as they are preserved in the Herbarium of Cornell

University. I wish to acknowledge here his courteous assistance, and to give the same acknowledgment to the curators of the Herbarium of the Geological Survey of Canada at Ottawa, of the Gray Herbarium, of the Herbarium of the Royal Gardens at Kew, of the Missouri Botanical Garden, of the New York Botanical Garden, of Stanford University, and of the U.S. National Herbarium for the loan of material representing the forms under discussion. For further material I am indebted to Miss ALICE EASTWOOD, San Francisco, California, Professor J. K. HENRY, Vancouver, B.C., Professor W. L. JEPSON, Berkeley, California, Mr. I. M. JOHNSTON, Upland, California, and Mr. J. C. NELSON, Salem, Oregon. I have also been able to go over the material of the Bebb Herbarium at the Field Museum, and am under obligation to Dr. C. F. MILLSPAUGH for what he has done to further my studies.

Sect. LONGIFOLIAE Andersson in Öfv. K. Vet.-Akad. Förh. **15**: 116. 1858; for further literature see SCHNEIDER in BOT. GAZ. **65**: 22. 1918.—Frutices mediocres (rariter parvi) vel alti arboresque, ramis densis caespitosis, cortice cinereo vel pl.m. brunnescente, ramulis elongatis virgatis brunneis vel purpureo-brunneis interdum nitidulis. Folia linearia, lanceolata, vel elliptico-oblonga, denticulata vel integerrima, nervis lateralibus satis distantibus, petiolis vulgo satis brevibus, stipulis saepe deficientibus vulgo parvis lanceolatis denticulatis. Amenta serotina vel primaria coetanea, pl.m. pedunculata vel ramos laterales normaliter foliatos saepe satis longos terminantia, singula vel ad 2–3 aggregata, pl.m. cylindrica, rarius ovalia; bracteae concolores, flavescentes, deciduae; flores masculi vulgo biglandulosi, diandri, filamentis liberis pilosis; feminei fere semper uniglandulosi, stylis nullis vel brevibus, stigmatibus bifidis laciniis linearibus vel brevibus; ovaria fructusve pilosi vel glabri, subsessiles vel pedicello glandulam usque duplo (rarius magis) superante instructi.

As already stated, the LONGIFOLIAE is an entirely American group, of which *S. taxifolia* var. *microphylla* ranges as far south as Guatemala, while a form of *S. longifolia* almost reaches the Arctic Circle in the Yukon Territory. From west to east the range of the group extends from the shores of the Pacific to those of the Atlantic, but it is not represented in southeastern United States from central

Virginia to Alabama and Florida. The center of its development is from California to Washington, Montana, and Texas.

Among the American willows the LONGIFOLIAE occupy an isolated position, and of the willows of the Old World it is difficult to say which can be taken for the nearest relatives of this group. I shall discuss this point later, and I can now only repeat that probably the forms of the sect. ALBAE Borr. might be regarded as rather closely related genetically to the LONGIFOLIAE.

In the following key it is recognized[1] that there are two rather well marked types in the group based on the form of the stigmas. In one, represented by *S. taxifolia* and *S. sessilifolia*, the lobes of the stigma are narrow and elongated, and in the older flowers mostly more or less revolute; while in the other group, the types of which are *S. exigua* and *S. longifolia*, the lobes are shorter and broader, not linear-lanceolate, the whole stigma often being quasi capitate. In some forms of *S. longifolia*, especially of var. *Wheeleri* from the northeast, the shape of the stigmas is rather intermediate. In the first group *S. taxifolia* is well distinguished from *S. sessilifolia* and its relatives by the short small aments, the small more or less globose anthers, and the small linear leaves; while *S. sessilifolia* and its varieties and *S. fluviatilis* have long cylindric aments, oblong-ellipsoid anthers, and longer, broader leaves. In the second group it is more difficult to separate the species because the main characters, glabrousness or pubescence of the ovaries and leaves, are more liable to variation. *S. melanopsis* with var. *Bolanderiana* represents a rather well marked type with glabrous ovaries, but in *S. exigua* as well as in *S. longifolia* we meet with forms of which the ovaries vary from densely pubescent to entirely glabrous. The

[1] It seems to be of interest to quote BEBB's opinion as to the possibility of a taxonomic arrangement of the forms of this section (BOT. GAZ. 16:104. 1891): "Clearly marked as are the outer limits of the group it presents no lines of cleavage within by which it can be satisfactorily divided. No natural characters are found to coincide with such assumed distinctions, for instance, the 'linear lobes of the stigma,' made prominent in the attempt to separate *S. sessilifolia*. Each portion after subdivision remains as heterogeneous as was before the aggregate group. It may be possible, by emphasizing first one character and then another, as these are found to predominate in the different forms, to designate a number of subspecies and varieties; but so bewildering and intangible is the reticulated intergrading that the difficulty of segregation seems only to be heightened by every fresh acquisition of the material."

pubescence of the leaves too is very changeable, and only in connection with other characters can it be used to separate certain species and varieties.

Clavis specierum

Amenta brevia, mascula 5–13 mm. longa et circ. 8 mm. crassa, feminea satis pauciflora, fructifera haud ultra 2:1.2 cm. magna; antherae minimae pl.m. globosae vel subglobosae, haud vel paullo longiores quam latae; stigmatum lobi lineares vel lineari-lanceolati, vulgo 4–6plo longiores quam lati; stylus nullus vel subnullus; ovaria sessilia vel brevissime pedicellata; bracteae vulgo satis late obovato-rhombicae, pl.m. acutae, praesertim extus satis dense villosae; folia minima vel parva, linearia vel lineari-lanceolata, 10–30:1.5–3.5 mm. magna, subtus semper pl.m. sericea, margine breviter denticulata vel subintegerrima . . . . 1. *S. taxifolia*

Amenta longiora vel antherae ellipticae, circ. $1\frac{1}{2}$–2plo longiores quam latae vel folia majora.

Stigmatum lobi lineares vel lineari-lanceolati, elongati, vulgo 4–5plo longiores quam lati, adulti pl.m. revoluti, stylo satis distincto iis breviore vel brevissimo fere semper bifido suffulti vel pl.m. sessiles; ovaria (saltem juniora) distincte sericea vel sericeo-villosula; folia novella semper utrinque pl.m. dense sericea vel sericeo-villosa.

Ramuli hornotini dense, etiam annotini pl.m. sericeo-villosi vel tomentelli; folia etiam adulta utrinque concoloria, canescentia, canoviridia vel viridescentia, semper pl.m. sericea vel sericeo-villosa, nervis primariss vix vel non visibilibus; ovaria semper satis dense sericeo-pilosa, sessilia vel subsessilia, pedicello fructuum quam glandula plus quam 2plo breviore; bracteae rarius extus versus apicem glabrescentes (confer etiam 4. *S. Parishianam*).

Folia ramulorum fertilium lineari- vel anguste lanceolata, fere semper distincte integerrima, etiam majora vix ad 8 mm. lata, apice pl.m. sensim acuminata, basi acuta, in petiolum satis distinctum attenuata, stipulis fere semper nullis, vel folia maxima majora, 6–8 cm. longa et ultra 8 mm. lata; amenta mascula 1.5–3 cm. longa et 5–6 (rarius 8) mm.

crassa, feminea fructifera 2–4 (–6): 0.8–1 cm. magna, ovaria (fructusque) sessilia vel subsessilia.

Folia fere semper lineari- vel anguste lanceolata et vulgo integerrima, stigmata semper satis elongata et pl.m. revoluta..... 2b. *S. sessilifolia* var. *Hindsiana*

Folia fere semper remote denticulata, interdum late lanceolata; stigmata breviora, paullo curvata et magis sessilia..... 2c. *S. sessilifolia* var. *leucodendroides*

Folia ramulorum fertilium (anguste vel) late lanceolata vel elliptico-lanceolata, majora 8–15(–17) mm. lata, saepe (saltem ad apicem) pl.m. distincte subspinuloso-denticulata, interdum paene sessilia, stipulis saepe pl.m. evolutis; amenta mascula 3–4.5 cm. longa et circ. 7 mm. crassa, feminea fructifera 4–6(–10) cm.: 8–10 mm. magna, ovaria (fructusque) subsessilia vel brevissime pedicellata

2. *S. sessilifolia*

Ramuli tantum novelli satis dense sericeo-tomentelli, jam hornotini glabrescentes vel glabriusculi vel folia adultiora satis glabra subdiscoloria, vel ovaria fructusque glabri vel subglabri (confer etiam var. *Wheeleri* sub 8. *S. longifolia*).

Folia anguste lanceolata ellipticave, interdum oblanceolata, apice pl.m. acuminata, basi acuta, distincte petiolata, stipulis saepe evolutis, adultiora superne intense viridia, subtus interdum subglaucescentia, satis glabrescentia vel tenuissime sericeo-pilosa, nervis etiam secundariis utrinque pl.m. visibilibus, ramulorum fertilium 7–14 mm. lata; ovaria initio pl.m. sericea vel sericeo-villosa, matura vulgo fere tota glabrescentia, subsessilia, pedicello fructuum glandula sicca interdum subaequilongo, bracteae fere semper extus versus apicem glabrescentes interdum basi excepta glabra..... 3. *S. fluviatilis*

Folia anguste linearia ad lineari-lanceolata, 1.5–5 (–8) mm. lata, utrinque pl.m. dense adpresse sericea; ovaria pl.m. sericea vel fere glabra, fructus partim pilosi vel glabri sed pedicello brevissimo vulgo piloso..... 4. *S. Parishiana*

Stigmatum lobi lanceolati vel elliptici, satis breves, saepissime 2–3plo longiores quam lati, adulti ut videtur nunquam distincte

revoluti, stylo nullo vel brevissimo non bifido suffulti, ovaria sericea vel glabra, subsessilia vel fructus pedicello glandulam interdum duplo superante instructi; folia ramulorum fertilium pl.m. dense sericea vel glabra.

Flores feminei glandulis 2 (dorsali interdum minima) instructi
6c. *S. exigua* var. *nevadensis*

Flores feminei glandula tantum ventrali instructi.

Glandulae florum masculorum 2 (ventralis et dorsalis).

Ovaria etiam juvenilia glaberrima.

Folia tantum valde juvenilia pl.m. distincte sericea vel ab initio pl.m. glabra vel tenuiter pilosa pilis saepe tantum sub lente visibilibus, utrinque concoloria vel superne viridia, subtus pallidiora, saepe pl.m. glaucescentia, nervis lateralibus secundariisque pl.m. prominulis.

Amenta fructifera valde densa, fructibus condensis breviter conicis pedicello subnullo vel satis brevi glandulam vix superante instructis, bracteae florum vulgo satis obovatae et truncatae; folia subtus fere semper pl.m. pallidiora vel glaucescentia, ramulorum sterilium satis late vel elliptico-lanceolata vel oblanceolata, rarius lineari-lanceolata.

Fructus 4.5–5.5 mm. longi (pedicello brevi excluso), amenta fructifera circ. 8–9 mm. crassa; folia ramulorum fertilium 3:0.4 ad 8:1.2, interdum ad 6.5:1.5 cm. magna, citissime glabrescentia vel pilis difficile visibilibus praedita (rarius initio satis dense adpresse argyraceo-sericea), satis distanter et breviter denticulata vel pl.m. integerrima; ramuli hornotini vulgo cito glabrescentes . 7. *S. melanopsis*

Fructus ad 6.5 mm. longi, amenta fructifera ad 1.2 cm. crassa; folia ramulorum fertilium ad 9:1.5 vel 17:1.7 cm. longa vel distinctius pilosa et denticulata vel ramuli hornotini magis pilosi
7b. *S. melanopsis* var. *Bolanderiana*

Amenta fructifera satis laxiflora fructibus separatis vel ovariis fructibusque longius conico-rostratis et pedicello distincto glandulam saepe duplo superante

instructis; bracteae florum vulgo oblongiores acutioresque; folia utrinque concoloria, pl.m. linearilanceolata vel linearia vel anguste lanceolata et satis distincte subdensius denticulata.

Fructus vix ultra 6 mm. (pedicello excluso) longi; folia anguste linearia, 2–4 mm. lata, venis lateralibus vix visibilibus magis impressis quam prominulis . . . . . 6d. *S. exigua* var. *tenerrima*

Fructus (5–)7–9 mm. longi; folia interdum paullo latiora, venis lateralibus pl.m. distincte prominulis 8b. *S. longifolia* var. *pedicellata*

Folia etiam adulta pl.m. sericea, utrinque (praecipue subtus) canescentia, venis lateralibus haud vel vix prominulis, ramulorum fertilium pl.m. lineari-lanceolata, integerrima vel satis distincte remote breviter denticulata; amenta fructifera pl.m. densiflora, fructibus pedicello glandulam saepe duplo superante instructis 6b. *S. exigua* var. *stenophylla*

Ovaria semper distincte sed interdum tantum pro parte sericeo-villosa vel sericea, fructus interdum fere vel omnino glabrescentes, subsessiles vel pedicello quam glandula pl.m. breviore suffulti, rarius distincte sessiles.

Folia ramulorum fertilium pl.m. integerrima vel tantum ad apicem parce et saepe indistincte denticulata, utrinque pl.m. canescentia, satis dense sericea vel etiam adulta non distincte glabrescentia et viridia venis etiam primariis vix vel paullo prominulis; fructus satis breviter conico-rostrati, amenta fructifera densa.

Folia etiam semiadulta utrinque (praesertim subtus) dense argenteo-sericeo-villosula, ramulorum fertilium saepe satis lanceolata, vulgo ad 8–10 mm. lata; ovaria juvenilia dense et longe sericea vel sericeo-villosula; fructus ellipsoideo-conici, 5–6.5 mm. longi (confer etiam 6c. *S. exiguam* var. *luteo-sericeam*) 5. *S. argophylla*

Folia minus dense, saepe tenuiter breviter adpresse sericea, ramulorum fertilium linearia vel lineari-

lanceolata, vulgo vix ultra 8 mm. lata vel ovaria angustiora apice magis capitata (incrassata) et fructus magis elongati .....6. *S. exigua*

Folia ramulorum fertilium pl.m. distincte denticulata, vulgo cito utrinque viridescentia et glabrescentia, adulta intense laete viridia et glabra (vel in var. *Wheeleri* utrinque pl.m. sericea), nervis etiam secundariis utrinque pl.m. prominulis; fructus magis elongati et rostrati; amenta fructifera pl.m. laxiflora (si amenta sunt valde densiflora et ovaria parce vel partim pilosa conf. etiam *S. melanopsidem* var. *Bolanderianam*)...8. *S. longifolia*

Glandula florum masculorum tantum una ventralis (rarius dorsalis minima adest); amenta feminea saltem novella ovariis dense albo-sericeo-villosis subsessilibus pl.m. micantia; glandula satis lata; folia ramulorum fertilium pl.m. linearia, 4–8 cm. longa et 1–5 mm. lata, ut in *S. longifolia* dentata et nervata.....8c. *S. longifolia* var. *angustissima*

Enumeratio specierum

1. S. TAXIFOLIA Kunth in Humb. and Bonpl., Nov. Gen. Pl. **2**:18. 1817; Sargent, Silva N. Am. **9**:129. *pl. 476*. 1896; Man. Trees N. Am. 175. *fig. 147*. 1905; Sudworth, Nomencl. Arb. Fl. U.S. 123. 1897, pro parte; Britton and Shafer, N. Am. Trees 202. *fig. 164*. 1908; for further literature and synonymy see SCHNEIDER in BOT. GAZ. **65**:23. 1918.—At present I have nothing to add to what I have already stated (*l.c.*) with regard to this species and its var. *microphylla* (Schl. and Cham.) Schn. There are several forms which look rather similar to *S. taxifolia*, but differ in the shape of the anthers and some other respects. I shall discuss them under *S. exigua*.

2. S. SESSILIFOLIA Nutt. N. Am. Sylva **1**:68. 1843,[2] reprint 1852; Anders. in Öfv. K. Vet.-Akad. Förh. **15**:116. 1858; in Proc. Amer. Acad. **4**:56 (Sal. Bor.-Am. 10). 1858; in Walp., Ann. Bot. **5**:746. 1858, incl. var. *villosa;* in K. Sv. Vet.-Akad. Handl. **6**:55. *pl. 4. fig. 36* (Monogr. Salic.). 1867; in DC. Prodr. **16**[2]:214. 1868;

[2] NUTTALL'S vol. 1 was issued in 2 parts; part 1 in 1842, containing pp. 1–54; while part 2, pp. 57–136, including the Salices, appeared in 1843.

Bebb in Watson, Bot. Calif. 2:85. 1879,[3] pro parte et exclud. synon.; Sargent, Rep. For. N. Am. 10th Census U.S. 9:168. 1884, pro parte et excl. var.; Silva N. Am. 9:127. 1896, pro parte; Sudworth in Bull. U.S. Dept. Agric. Div. For. 14:122 (Nomencl. Arb. Fl.). 1897, pro parte; For. Trees Pac. Slope 223. 1908, pro parte; Eastwood, Handb. Trees Calif. 37. 1905, pro parte; Britton and Shafer, N. Am. Trees 196. 1908, pro parte minima; Howell, Fl. Northw. Am. 1:618. 1902; Piper in Contr. U.S. Nat. Herb. 11: 213 (Fl. State Wash.). 1906; Ball in Bot. Gaz. 60:49. *fig.* 2. 1915; in Piper and Beattie, Fl. Northw. Coast 115. 1915; Henry, Fl. S. Br. Col. 96. 1915; Rydberg, Fl. Rocky Mts. 192. 1917, pro parte. —*S. sessilifolia* var. *villosa* And. in K. Sv. l.c. 56 et Prodr. l.c. 214.— *S. macrostachya* Nutt., N. Am. Sylva 1:72. 1843; Howell, Fl. l.c. 619, pro parte; Rowlee in Bull. Torr. Bot. Club 27:250. 1900, pro parte et excl. var.; Rydberg, Fl. l.c. 192.—*S. macrostachya* var. *Cusickii* Rowlee, in Bull. l.c. *pl. 9, fig. 5*, sine descr.—*S. longifolia* var. *sessilifolia* Jones, Willow Fam. 24. 1908.

Type locality.—Oregon, "on the rocky borders of the Oregon [Columbia] at the confluence of the Wahlamet" [Willamette]. Range: from western Oregon, Douglas County, along the Umpqua and Willamette River to the Columbia and Lewis rivers in Washington, thence again in northern Washington, Whatcom County, and southwestern British Columbia.

S. sessilifolia was the only one of Nuttall's species which has been correctly interpreted by Andersson, who cites for the type *Lyall's* specimens from the Sumass Prairie, of which the male is no. 78 and the female no. 31 in Herb. K.[4] They were collected in 1858 "near the 49th parallel of lat." In the herbarium Andersson first had named the specimen *S. Grayi*, but this name has never been published. For his var. *villosa* the type was collected by *Lobb* in 1852 in Oregon, bearing the no. 218 in Herb. K. *Lobb's* and *Lyall's*

[3] Bebb's treatment of the Californian Salices in Watson's *Flora* was published separately in 1879.

[4] Besides the abbreviations mentioned in Bot. Gaz. 65:9 and 66:121, the following will be used: Cal., Herbarium of the California Academy of Science; K., Kew Herbarium; Jeps., Herbarium of Professor W. L. Jepson, Berkeley, Cal.; N.E., Herbarium of the New England Botanical Club; P., Herbarium of the Academy of Science at Philadelphia, Pa.; Reno, Herbarium of the Nevada Agric. Exper. Station, Reno, Nev.; St., Herbarium of the Leland Stanford University.

plants are exactly alike. NUTTALL himself gave an excellent description, and it is rather astonishing that the species could have ever been misunderstood. He described another species, however, *S. macrostachya*, "from the banks of the Oregon" [Columbia], of which there is a sterile(!) cotype in Herb. P. and a branchlet with an old fruiting ament in Herb. G. According to some remnants the style and the stigmas are exactly as in *S. sessilifolia*, and there is no difference in the shape and pubescence of the leaves. Judging by NUTTALL'S statement "amentis longissimis praecocibus," he had before him a very early flowering state, and the fragment in G. shows an old, almost sessile, long, fruiting ament which naturally looks very different from the normal late flowering form with the aments at the top of rather long leafy branchlets. The sheet in P. also contains a female branch of which I do not know the origin, because it is only partly represented in the photograph. It seems to me that this branchlet belongs to the true *S. argophylla* Nutt., which has a similar foliage and pubescence but shorter stigmas, looking more or less intermediate between *S. sessilifolia* and *S. exigua*. I shall deal with it later. It has been mostly taken hitherto for *S. macrostachya*. BALL (1915) also referred specimens from California to *S. sessilifolia*, but those forms I take for var. *Hindsiana*. Sterile specimens collected by *J. G. Jack* in Oregon, Josephine County, Grant's Pass, August 23, 1904, and at the same locality and time by *A. Rehder*, seem to me to belong rather to *S. argophylla* than to *S. sessilifolia*. In British Columbia, Westminster County, New Westminster, banks of Fraser River, *J. K. Henry* collected good material on June 24, 1912, and May 9 and September 25, 1914 (m., fr., st.; Cal.). The largest leaves I have seen measure up to 9:2 cm.

2b. S. SESSILIFOLIA var. HINDSIANA And. in Öfv. K. Vet.-Akad. Förh. 15:117. 1858; in Proc. Am. Acad. 4:56 (Sal. Bor.-Am. 11). 1858; in Walp., Rep. Bot. 5:746. 1858; Bebb in Watson, Bot. Calif. 2:85. 1879; Sargent, Rep. For. N. Am. 10th Census U.S. 9:169. 1884, excl. synon. var. *tenuifolia;* Eastwood, Handb. Trees Calif. 38. 1905.—*S. Hindsiana* Benth. Pl. Hartw. 335. 1857; Torrey in Pacif. R.R. Rep. 4^5:138. 1857; Newberry in Pacif.

R.R. Rep. 6^3:89. 1857; And. in K. Vet.-Acad. Handl. 6:56 (Mon. Salic.). 1867, excl. *pl. 4, fig. 37* et var.—*S. longifolia* var. *argyrophylla* f. *angustissima* And. l.c. 55; in DC. Prodr. 16^2: 214. 1868. sec. specim. Fremontii.—*S. longifolia* Greene, Man. Bot. S. Fran. Bay 299. 1894, pro parte max.—*S. sessilifolia* Sarg., Silva N. Am. 9:127. 1896, pro parte; Jepson, Fl. Calif. 339. 1909, pro parte max.; in Mem. Univ. Calif. 2:178 (Silva Calif.). 1910, prop arte max.; Ball in Bot. Gaz. 60:51. 1915, pro parte.

Type locality.—California, "ad ripas fluvii Sacramento." Range: central California to southwestern Oregon.

Of *S. Hindsiana* I have seen a photograph of the type (K.) and cotypes (G., N.) collected by *Hartweg*, which are all perfectly identical. It is closely related to typical *S. sessilifolia*, from which it differs chiefly by its more linear or narrowly lanceolate and almost always entire leaves, which are more or less distinctly petioled, and by its usually smaller and thinner aments. If it were not for some specimens which seem to combine var. *Hindsiana* with the northern *S. sessilifolia*, and others that I can hardly distinguish from the southern var. *leucodendroides* (for instance a vigorous sterile specimen from Yolo County, mouth of Buckeye Creek, lg. *R. Stinchfield*, no. 334; St.), I should take it for a distinct species. A closer study of those forms in the field is certainly needed.

There seems to occur a form with almost glabrate ovaries, judging by a specimen collected by *R. S. Ferris* in Colusa County, Sycamore Slough, April 17, 1917 (no. 619, m., f.; St.). It is otherwise rather typical var. *Hindsiana* and needs further study.

The range of this variety extends to Jackson County in southern Oregon (*Walpole*, no. 255; *Applegate*, nos. 624 and 2198) in the north, and to Monterey[5] and Kern counties in California in the south, but the southern forms like *Piper's* no. 6406 from Bakersfield come very near var. *leucodendroides*.

2c. S. sessilifolia var. leucodendroides Schneider in Bot. Gaz. 65:26. 1918.—*S. macrostachya leucodendroides* Rowlee in Bull.

[5] From this county is *Brewer's* no. 544, which came from the Nacimiento or Nacimento River or Creek, not "Narsismente" or "Nasismento" River, as the name is spelled by Rowlee and Ball according to the label in C. It is a male specimen with leaves much like var. *leucodendroides*, to which it may belong after all.

Torr. Bot. Club 27:250. *pl. 9. fig. 6.* 1900; Abrams, Fl. Los Angeles suppl. ed. 102. 1911.—*S. integrifolia* var. *leucodendroides* Rowl., l.c. sphalmate in textu.—*S. argophylla* Rowl., l.c., pro parte.—*S. exigua* var. *virens* Rowl., l.c. 256, pro parte.—*S. sessilifolia* Eastwood, Handb. Trees Calif. 37. 1905, pro parte; Britton and Shafer, N. Am. Trees 196. 1908, pro parte; Jepson in Mem. Univ. Calif. 2:178 (Silva Calif.). 1910, pro parte.—*S. macrostachya* Abrams, Fl. l.c. 101, non Nutt.—ROWLEE cites 3 specimens from southern California under his variety, namely *Parish's* nos. 2134, 2040, and 640. The last number is quoted by him also under his *S. argophylla.* It belongs to var. *leucodendroides.* No. 2134 represents an early flowering state of the male plant with small leaves and short peduncles of the catkins which measure up to 2:0.9 cm. The bracts are almost glabrate and often somewhat denticulate at apex, a fact we may also observe in other forms of *S. sessilifolia.* No. 2040, in my opinion, can be regarded as the typical var. *leucodendroides,* which seems to differ from var. *Hindsiana* chiefly in its comparatively longer and broader, very often distinctly denticulate leaves (with fine distant teeth), measuring usually from 7:1.2 to 13:1.8–2 cm. (in var. *Hindsiana* the corresponding entire leaves are about 3–10 cm. long and 3–10 mm. wide, while in the typical *sessilifolia* they measure from 5:0.8–1 to 8:3 cm., being distinctly denticulate with fine linear teeth), and by its stigmas, which usually are almost sessile and somewhat shorter and broader than in var. *typica* or var. *Hindsiana.* Some plants look almost like hybrids with *S. Parishiana* or the form of *S. exigua* from southern California. I can but repeat that a proper understanding of all these forms can only be gained by a careful study of them in the field. See also my remarks under *S. Parishiana* and *S. argophylla.*

I give an enumeration of the specimens I am inclined to refer to var. *leucodendroides,* and I should be glad to receive some information by collectors who visit these localities as to the different forms of willows growing together there.

SPECIMENS EXAMINED.—San Diego County: Santa Ysabel Creek, May 1893, *R. D. Alderson* (no. 700, f.; Cor.; ovariis parce sericeis; cited by ROWLEE under *S. exigua virens*); Mountain Spring, May 10, 1894, *E. A. Mearns* (no.

3040, m.; W.).—Riverside County: Santa Ana River, N.W. of Corona, very common, 150 m., May 26, 1918, *I. M. Johnston* (no. 1994, m., f.; A.); same place, 180 m., very common along river banks, June 9, 1917, *Crawford* and *Johnston* (no. 1244, m.; A.; St.); Temescal Canyon, along a dry wash, 400 m., May 30, 1918, *I. M. Johnston* (no. 2017, fr.; A.); same river, near Riverside, May 1888, *S. B. Parish* (no. 2040, f., type; C., Cor.); San Jacinto, along San Jacinto River, March 31, 1896, *A. J. McClatchie* (m., f.; N.; early flowering form, somewhat uncertain); eastern base of San Jacinto Mts., along the borders of the Colorado Desert, June 1901, *H. M. Hall* (no. 2105, m., f.; M.; ovariis laxe sericeis, stigmatibus mediocribus); San Jacinto River Canyon, gravelly ground along the river, common, May 12, 1918, *Durand* and *Street* (no. 23, f.; A.).—Orange County: Santa Ana River, June 1880, *S. B. Parish* (m.; A., M.; "12 ft. high").—Los Angeles County: Los Angeles, 1879, *J. C. Nevin* (m.; G.; fragment); San Gabriel River at El Monte, common along river, 90 m., May 13, 1917, *I. M. Johnston* (no. 1242, m., f.); same place, July 7, 1887, *Tracy* and *Evans* (no. 383, m.; N.); San Gabriel Mts., San Antonio Canyon, 1450 m., July 9, 1918, *F. G. Peirson* (no. 14, m.; Jeps.); canyon near San Rafael, March 31, 1888, *H. E. Hasse* (no. 3801, f.; N.; var. *Hindsianae* valde similis); sandy flat along the Los Angeles River, May 30, 1888, *H. E. Hasse* (no. 4092, m., f.; N.; stigmata iis *S. exiguae* satis similia); Los Angeles River bottom, near Los Angeles, September 9, 1917, *F. Grimmel* (fr.; St.).—San Bernardino County: San Bernardino Valley, dry sandy banks of Lyth Creek, in a large thicket, April 4, 1891, *S. B. Parish* (no. 2134, m. syntype; Cor. and C., both named *S. macrostachya* by Rowlee; "about 4 ft. high"); Lyth Creek Wash, damp land, alt. circ. 300 m., May 2, 1917, *S. B. Parish* (no. 11134, f., fr.; A.; fructibus satis glabris); vicinity of San Bernardino, alt. 300–750 m., April 8, 1899, *S. B. Parish* (no. 4591, m.; St.; 4592, f., fr.; St.; the last number represents a small-leaved form much resembling *S. taxifolia* as well as var. *Hindsiana;* needs further observation); April 13, 1903, *S. B. Parish* (no. 5197, f.; St.; same small-leaved form); May 15, 1901, *S. B. Parish* (nos. 4786, m., 4787, f., fr.; N., St.; structura florum paullo ad *S. exiguam* vergens); March 1881, *S. B.* and *W. F. Parish* (no. 640, m., fr.; A.; var. *Hindsianae* satis similis, sed stigmatibus subbrevioribus, in C. magis typica); February 20, 1881, *W. G. Wright* (nos. 10, 11, m., 12, f.; C.; "small bush 6–10 ft."); March 1 and 14, 1881, *W. G. Wright* (nos. 6, m., 7, f.; C.; early flowering specimens with short aments which look rather different); Colton, April 28, 1882, *M. E. Jones* (m., fr.; A.); Waterman Canyon, August 1900, *Shaw* and *Illingworth* (no. 4, m.; St.; amentis brevibus, antheris parvis, sed foliis normalibus); Keenbrook, Kajon Pass, May 30, 1901, *S. B. Parish* (no. 4930, f., m.; St.; very much like *S. exigua*, but the female flowers more like those of var. *leucodendroides*); same Pass, July 6, 1908, *LeRoy Abrams* and *L. E. McGregor* (no. 694, f.; St.); Cucamonga Canyon, small colony on bed of a small side canyon, alt. 900 m., May 27, 1917, *I. M. Johnston* (no.

1241,[6] m.; St.).—Ventura County: Ventura, along beach, April 17, 1916, *A. Eastwood* (no. 5034, m., 5035, f.; Cal.).—Santa Barbara County: Santa Ynez River, alt. 600 m., May 1894, *C. Franceschi* (m.; A.; quasi ad var. *Hindsianam* transiens).—Tulare County: shores of Kern River, Peppermint Valley, alt. 1440 m., July 16, 1895, *W. R. Dudley* (no. 779, m.; St.); gravelly bars of Kaweah River at Three Rivers, July 20, 1900, *W. R. Dudley* (no. 2703, st.; St.); Three Rivers, near Brittons, June 15, 1902, *W. R. Dudley* (m., fr.; St.; all these forms of Tulare County come near var. *Hindsiana;* the fruiting aments of the last specimen measure up to 6:1 cm.). See also *Brewer's* no. 544 mentioned in the preceding note.

Specimens from Kern County, Bakersfield, September 28, 1910, *E. M. McGregor* (no. 13, m.; St.), look much like *S. exigua* and need further observation. There is a specimen from Santa Barbara County, Ojai, Cliff Glen, March 15, f., April 3, 1896, m., *F. W. Hubby* (no. 56; Cor.), of which the leaves much resemble *S. taxifolia*, but those of the more vigorous shoots seem to become larger. The female flowers have 2 glands, and the stigmas are rather short but agree with those of some forms I have referred to var. *leucodendroides*. I am not quite sure about this specimen, but I strongly suspect that it is a form of var. *leucodendroides* grown in a very arid position. It is similar to *Parish's* nos. 4591, 4592 already mentioned.

3. S. FLUVIATILIS Nuttall, N. Am. Sylva 1:73. 1843; Ball in BOT. GAZ. 60:52. *fig. 3.* 1915; in Piper and Beattie, Fl. Northwest Coast 114. 1915.—*S. sessilifolia* Sargent, Silva N. Am. 9:127. *pl. 475.* 1896, pro parte, non Nuttall; Rowlee in Bull. Torr. Bot. Club. 27:250. *pl. 9. fig. 8.* 1900; Howell, Fl. Northwest. Am. 1:618. 1902, pro parte; Sudworth, For. Trees Pacif. 223. *figs. 91, 92.* 1908, pro parte; Rydberg, Fl. Rocky Mts. 192. 1917, pro parte.—NUTTALL says: "This species lines the immediate border of the Oregon [Columbia] a little below its confluence with the Wahlamet"

[6] No. 1243 of the same collector from Red Hill, near Upland, April 28, 1917, apparently represents the female form of the same willow. Mr. JOHNSTON kindly sent me the following note regarding this number: "1243 from Cucamonga Canyon. Small colonies of this willow occur in scattered localities in the lower canyons of the San Antonio Mountains; although common in the valley it is uncommon in the mountains. 1243 came from one of these isolated colonies, and from absolute knowledge I know that no other colony of this or any other LONGIFOLIAE occurs within 3 miles. The associated *Salix* spp. were *S. laevigata* and *S. lasiolepis*. Nothing like *S. exigua* occurs for miles. This is by no possibility a hybrid." Judging by the stigmas this form is more closely related to *S. exigua* than to *S. sessilifolia*. The forms of this part of S. California need a special study, and it is almost impossible to express a definite opinion on them as long as *S. Parishiana* and *S. exigua* and its varieties are not yet properly understood.

[Willamette], and "we met this species likewise on the bank of the Lewis River of the Shoshonee." The first locality has been visited by BALL, and I follow him in his interpretation of this species. Unfortunately no type specimen exists, and from NUTTALL'S statement that "the germ is smooth, with 4 sessile stigmas" I believe that he had partly *S. melanopsis* before him from the second locality quoted, which is on the Snake River in western Idaho. At present the true *S. fluviatilis* is only known from "the lower part of the Willamette River and adjacent Columbia River" in Oregon, Multnomah County, ranging eastward to Wasco County, The Dalles, where *Ball* collected it on June 24, 1915 (nos. 1997, m., 1998, 1999, f., 2000, androgyn., 2005, fr., 2007, m., 2015, fr.; C., G.). It has also been found on the opposite bank of the Columbia, in Klickitat County, Wash., by *Suksdorf*, April 23, May 31, 1881 (no. 6, f., m.; C. [7876]). Other specimens of *Ball's* (nos. 1857, 1858, 1859; fr. adult.; G.) from northeastern Utah, Cache County, Logan Canyon, above Logan, in my opinion are somewhat uncertain. They suggest certain forms of *S. melanopsis* var. *Bolanderiana*, and indeed *S. fluviatilis* seems in some respects to be quasi intermediate between *S. sessilifolia* and *S. melanopsis*. BALL himself says: "The species is quite different from the true *sessilifolia*. It is closely related to *S. melanopsis* Nutt." But he also states: "The style and stigmas indeed are very similar to those of true *S. sessilifolia*." In fact, specimens collected by BALL on the shores of the Umpqua River, near Roseburg, Oregon (no. 1961, 1962, f., fr.; G.), and distributed by him as "?*S. Bolanderiana* (×*sessilifolia*)," are somewhat similar to *S. fluviatilis*, which, however, seems to be a good species of a very local distribution, quite different in the structure of the male flowers from that of the *melanopsis* group.

4. S. PARISHIANA Rowlee in Bull. Torr. Bot. Club 27:249. *pl. 9. fig. 3.* 1900; Abrams, Fl. Los Angeles suppl. ed. 101. 1911.—*S. sessilifolia* Jepson, Fl. Calif. 339. 1909, pro parte, non Nutt.; in Mem. Univ. Calif. 2:178 (Silva Calif.) 1910, pro parte.—*S. longifolia* var. *argyrophylla* Jeps. in Mem. l.c. pro parte.—*S. argophylla* Abrams, l.c. 102, pro parte.—This is a peculiar and rather obscure species of which ROWLEE has given a somewhat unsatisfactory description.

As type is cited *Hobby's* (recte *Frank Hubby*[7]) nos. 54, 55 from Matilija Canyon, Ventura County (not in San Bernardino County or, as is written on the label of the type no. 54 before me, Santa Barbara Co.). Besides this there is given on the label for the female specimen "Cliff Glen," and for the male "Ojai Springs," localities near Matilija. The flowers are young, and the ovaries are not "densely villous" but, at least partly in no. 55, glabrescent toward the apex and base, and rather silky pubescent. The specimens could easily be taken for *S. exigua* were it not for the fact that the lobes of the stigmas are narrower, about 3 times as long as thick, and the styles distinct but short. ROWLEE also cites a specimen collected by *Coville* and *Funston* (no. 263) at Spring Valley, Inyo County, but this is sterile. Only in Herb. W. I have found a few fruits attached to it which look much like those of *S. exigua*. I find it difficult to express a definite opinion on *S. Parishiana*, but I wish to enumerate the following specimens which may represent the same form. It looks intermediate between *S. exigua* (of southern California) and *S. sessilifolia* var. *leucodendroides*, and similar forms seem to occur in the region where var. *Hindsiana* reaches the southern limit of its range. The question whether we have to do with forms of hybrid origin or with a distinct species can only be solved by careful observation in the field. See also the indications given in the key.

SPECIMENS EXAMINED.—California: Venturia County: Matilija Canyon (see the remarks given in the preceding text), April 3, 1896, *F. W. Hubby* (no. 54, m. and f. types; Cor.), April 19, 1896, *F. W. Hubby* (no. 55, fr.; Cor.); Mt. Pinos Region, Goodenough Meadow, June 28, 1896, *W. R. Dudley* and *A. F. Lamb* (no. 4717, fr.; St.; fructibus parvis vix 5 mm. longis probabiliter nondum perfecte maturis); Sespe Creek, near Ten Sycamore Flat, alt. 600–750 m., June 9, 1908, *Abrams* and *McGregor* (no. 169; G., St.); Mt. Pinos Region, below Snedden's, Lockwood Creek, June 23, 1896, *Dudley* and *Lamb* (no. 4632, st.; St.; vel *exigua*). Los Angeles County: Burbank, 1904, *J. C. Nevin* (m., fr.; St.; very near *S. exigua*); Inglewood, April 12, 1901, *LeRoy Abrams* (no. 1493, f.; St.; glandulis 2, forma incerta); Florence, old bed of the Los Angeles River, April 13, 1903, *L. Abrams* (no. 3255, m., f.; M., St.; in floribus femineis interdum glandula dorsalis adest); same county?, Leakside, *J. B. Grant* (no. 6960, f.; St.; "shrub 8 ft. high"); San Antonio

[7] For correct statements regarding this name and the following localities I am much indebted to Mr. S. B. PARISH.

Mts., Prairie, fork of San Gabriel River, moist ground in a small open flat, alt. 1700 m., August 23, 1917, *I. M. Johnston* (no. 1685 m.; St.); San Bernardino County: San Bernardino, May 15, 1913, alt. 400 m., *W. L. Jepson* (no. 5591 m., fr.; A.). Orange County: Santa Ana, spring 1902, *H. D. Geis* (no. 653 vel 553; f., fr.; St.). San Diego County: Oneonta, April 24, 1904, *H. P. Chandler* (no. 5116, f., fr., m.; N.; porro observanda); near Tia Juana, June 1895, *S. G. Stokes* (f.; St.; stigmata pl.m. sessilia, forma porro observanda); same place, April 24, 1913, *A. Eastwood* (no. 2926, m.; A.); Tia Juana River, August 1902, *A. C. Herre* (fr.; St.; ut no. 4632).—Northern Lower California: Causito(?), May 29, 1883, *C. R. Orcutt* (no. 1180, fr.; M.; ut praecedens, sed amentis duplo brevioribus, ovariis pedicello quam glandula pl.m. sublongiore instructis). Kern County: along the Santa Fe Railroad, in low moist ground about 2 miles west of Bakersfield, April 6, 1905, *A. A. Heller* (no. 7591, m., f.; A., C., M., St.; looks somewhat like *S. exigua*×var. *Hindsiana;* "shrub 6 or 8 ft. high"). Inyo County: on the old Mitchell Range, resting Spring Valley, alt. 525 m., February 6, 1891, *F. V. Coville* and *F. Funston* (no. 263, st.; W.; see preceding remarks). Tulare County: Tule River above Porterville, March 27, 1897, *W. R. Dudley* (no. 3578, f.; St.; pubescentia foliorum valde juvenilium fere ut in var. *Hindsiana*, sed ovaria parce pilosa iis *S. Parishianae* simillima).

5. S. ARGOPHYLLA Nutt. N. Am. Sylva 1:71. *pl. 20.* 1843; Rowlee in Bull. Torr. Bot. Club 27:252. 1900, pro parte; Howell, Fl. Northw. Am. 2:618. 1902, pro parte; Piper and Beattie, Fl. Palouse Reg. Wash. 53. 1901; Piper in Contr. U.S. Nat. Herb., 6:213 (Fl. Wash.). 1906, pro parte.—*S. macrostachya* Piper, l.c. 214 non Nutt.; Henry, Fl. S. Br. Col. 96. 1915.—*S. sessilifolia* Britt. and Shafer, N. Am. Trees 196. *fig. 156.* 1908, pro parte.—This species, in my opinion, has been misunderstood by almost every later author, owing probably to the inaccurate representation in NUTTALL'S plate. His Latin description runs:

Salix argophylla, foliis lineari-sublanceolatis acutis sessilibus integerrimis utrinque argenteo-sericeis, stipulis obsoletis, amentis serotinis diandris, capsulis villosis lanceolatis. Besides this he says: "This species becomes a small tree from 12 to 15 ft. in height, as silvery and white as the *Leucodendron argenteum*, the branches are brown, but the twigs are hoary with villous hairs. The leaves are very much crowded, soft, with whitish shining silky down, so abundant on either side as wholly to hide the veins, and nearly the midrib; they are also nearly without footstalks, entire on the margin, of a narrow linear outline and sharply acute, with a distinct bristly point, 1.5 to 2 inches long, and only about 3 lines wide. Stipules small and linear, seldom seen. The aments come out late with the leaves, and the flower branches produce 4–7 leaves. The male ament is small and narrow, with the scales lanceolate and villous, the female

aments are oblong, the capsules lanceolate and villous. . . . . We perceive no affinity that this species bears, except perhaps to the *S. angustifolia* of the borders of the Caspian, from which at the same time it is probably very distinct.

NUTTALL'S statements indicate that the main character of *S. argophylla* is the soft, villous, white pubescence which is also a characteristic of *S. sessilifolia* and *S. macrostachya*. He does not indicate the shape of the stigmas, owing probably to the fact that he collected only plants with mature capsules. The type locality is "one of the branches of the Oregon [Columbia], the river Boisée, toward its junction with the Shoshonee" [Snake River] in western Idaho, Canyon County. So far as I know there is no type in existence, but *Nelson* and *Macbride's* no. 1057 and *Macbride's* no. 228 from the same county seem identical with NUTTALL'S species. ANDERSSON mentioned it first in his monograph in 1867 as follows:

"*S. longifolia* ***argyrophylla:* (Nutt. Sylva Amer. p. 87 ?): foliis et capsulis tomento argenteo tomentoso-micantibus.—In regionibus meridionalibus, ut in Mexico, etc.," and he adds a forma "*angustissima:* foliis anguste linearibus." "Hab. in ripis in California (Fremont); Rocky Mountains (Nuttall)," giving as a synonym "*S. brachycarpa* Nutt. Amer. Sylva p. 85?."

In the Prodromus (1868) ANDERSSON cites under his *S. longifolia*, *argyrophylla Berlandier's* no. 2371 (recte 2341) and *Wright's* no. 1873, and adds a forma *opaca*. He certainly misunderstood NUTTALL'S species entirely, and owing to the changed spelling of the name we may regard his var. *argyrophylla* as quite a new form which has nothing at all to do with *S. argophylla*. For a further explanation of ANDERSSON'S plant see under *S. longifolia* var. *angustissima*. *S. longifolia argyrophylla* of BEBB and other authors as well as *S. fluviatilis argyrophylla* Sargent are names applied to forms of very different origin, and may sometimes include the true *S. argophylla*, but mostly seem to refer to *S. longifolia* var. *Wheeleri*. ROWLEE (1900) mixed with it *S. Hindsiana* Benth. and also forms which belong to *S. exigua* and *S. sessilifolia leucodendroides*. PIPER (1906) and BALL (in different herbaria) referred the forms I take for *S. argophylla* mostly to *S. macrostachya*, but NUTTALL'S type of this species belongs to *S. sessilifolia*, as previously explained.

Male or sterile specimens of *S. argophylla* are not always easily separated from *S. sessilifolia*, as for instance those collected by

Jack and also by *Rehder* on Grant's Pass, Oregon. The female plants show almost the same stigmas as in *S. exigua*, and *S. argophylla* looks often quite intermediate between this species and *S. sessilifolia*.

So far as can be judged at present by the specimens enumerated, its range seems to extend from Bonneville County in eastern Idaho, along Snake River to Canyon, Washington, and Nez Perces counties, and into adjacent Washington (Walla Walla, Whitman, and probably also Franklin and Lincoln counties) as far as western Klickitat County, while in Oregon the species occurs in Sherman and Wasco counties, the forms from Klamath and Josephine counties being rather uncertain. The male specimen from British Columbia cited later looks much like *S. sessilifolia*, but Professor PIPER, with whom I have had an opportunity to discuss the matter, believes it is better referred to *S. argophylla* for geographical reasons. Only a close study in the field, especially of the forms of southern Washington and northern Oregon in the region of the Columbia and its tributaries, can elucidate the relationship of *S. argophylla* with *S. sessilifolia* and the limits of their geographical distribution. At present I can hardly do more than to indicate what form has to be taken for NUTTALL's *S. argophylla*, and how it seems to be related to and connected with either *S. sessilifolia* or *S. exigua*. It would be rather misleading to make too decisive statements as long as one's information is merely based on herbarium material.

SPECIMENS EXAMINED.—Idaho: Bonneville County: Idaho Falls, among rocks, along river, July 4, 1901, *E. D. Merrill* and *E. N. Wilcox* (no. 803, m.; G.; "4–5 ft."); Canyon County: Falk's Store, slough and creek banks, alt. 660 m., July 11, 1911, *A. Nelson* and *Macbride* (no. 1057, fr.; G., M., St.); along the river, same alt., June 7, 1910, *J. F. Macbride* (no. 228, m.; G., M., St.); Caldwell, irrigation ditch, October 1, 1910, *C. R. Ball* (no. 1705, fr.; W.; "10 ft."); Washington County: Weiser, alt. 660 m., July 5, 1899, *M. E. Jones* (no. 6554, f., fr.; W.); ?Nez Perce County: Clear Water River, June 18, 1894, *L. F. Henderson* (f., fr., non m.; W.; same as no. 2878 in C.; forma satis ad *S. exiguam* spectans).—Washington: Walla Walla County: Waitsburg, June 24, 1897, *R. M. Horner* (R. 454, B. 451, m.; G., W.); Whitman County: Wawawai, July 9, 1901, *C. V. Piper* (no. 3592, m.); same place and collector, June 13, 1901 (no. 3595, m.); West Klickitat County: Columbia River, damp or wet places, May 31, July 1884, *W. N. Suksdorf* (m., f., fr.; C.,

M., St.); Franklin County: Pasco, June 1902, *H. P. Baker* (no. 70, m.; M.; vel ad *S. sessilifoliam* referenda); Lincoln County: Sprague, alt. 560 m., June 3, 1893, *J. H. Sandberg* and *J. B. Leiberg* (no. 134; W.; forma porro observanda, paullo ad *S. exiguam* spectans).—Oregon: Sherman County: Biggs, along stream, 1 mile south of Columbia River, August 1, 1914, *C. R. Ball* (no. 1848, fr.; W.); Wasco County: Tygh Valley, June 1881 (vel 1880), *T. J. Howell* (m. vel androgyn.; A., M.); Hood River County, Hood River, May 25, 1879, *J. T. J. Howell* (m. vel androgyn.; C.); Klamath County: along Sprague River above Yainax Valley, *F. V. Coville*, August 23, 1902 (no. 1312, st.; forma quamvis incerta); Josephine County: Grant's Pass, August 23, 1904, *J. G. Jack* (st., A.; forma incerta); same place and date, *A. Rehder* (st.; "large shrub"; ut praecedens); ? County: Cache Bar, between Cache and Gordon creeks on Snake River, alt. 380 m., June 19, 1897, *E. P. Sheldon* (no. 8325, m.); east Oregon, without exact locality, stream banks, May 9, June 7, September 1898, *W. C. Cusick* (no. 1860, m., f., fr.; M.; "a straight upright shrub"; forma foliis lanceolatis satis denticulatis).—British Columbia: Kootenay District, Cascade, near international boundary between Kettle and Columbia rivers, June 26, 1902, *J. M. Macoun* (no. 68128, O.; m.; G.).

6. S. EXIGUA Nutt. Sylva N. Am. **1**:75. 1843; Rowlee in Bull. Torr. Bot. Club **27**:255. *pl. 9, fig. 15.* 1900, pro parte; Piper and Beattie, Fl. Palouse Reg. Wash. 53. 1901; Howell, Fl. Northw. Am. **1**:618. 1902; Piper in Contr. U.S. Nat. Herb. **6**:213 (Fl. Wash.). 1906; Britton and Shafer, N. Am. Trees 195, *fig. 155.* 1908; Ball in Coult. and Nels., New Man. Rocky Mts. Bot. 131. 1909; Garrett, Spring Fl. Wasatch Reg. 10. 1901, pro parte; ed. 2. 16. 1912, pro parte; Rydberg, Fl. Rocky Mts. 192. 1917, pro parte.—*S. longifolia* var. *β* Hooker, Fl. Bor. Am. **2**:149. 1839, quoad specim. Tolmieana.—*S. longifolia* Wats., Cat. Pl. Nev. Utah, in King's Rep. **5**:324. 1871, quoad specim. no. 1094, non Muhl.; Bebb in Coult., Man. Rocky Mts. Bot. 335. 1885, pro parte; Jeps. in Mem. Univ. Calif. **2**:178 (Silva Calif.) 1910, pro parte.—*S. longifolia* var. *exigua* Bebb in Wats., Bot. Calif. **2**:85. 1879; Jones, Willow Fam. 24. 1908, pro parte.—*S. longifolia* var. *argyrophylla* Macoun Cat. Can. Pl. **1**:450. 1883, pro parte; Jeps. in Mem. l.c. pro parte.—*S. fluviatilis* var. *exigua* Sarg., Silva N. Am. **9**:124. 1896, pro parte; Sudworth in Bull. U.S. Dept. Agr. Div. For. **14**:122 (Nomencl. Arb. Fl.). 1897, pro parte max; For. Trees Pacif. Slope 223. 1908.—*S. longifolia* var. *argophylla* Jones, Willow Fam. 24. 1908, pro parte.—*S. argophylla* Henry, Fl. S. Br. Col. 96. 1915;

Rydbg., Fl. Rocky Mts. 188. 1917.—The type of this species was collected by *Nuttall* with his *fluviatilis*, probably "on the banks of the Lewis River of the Shoshonee" (Snake River in Idaho), because at the type locality of *S. fluviatilis* on the Columbia in the vicinity of Portland, Oregon, this species is apparently the only one of the LONGIFOLIAE according to BALL (BOT. GAZ. 60:45, in note, 1915). *Nuttall* says: "This species is also a native of the territory of Oregon, and grew with the preceding, which it strongly resembles" (*S. fluviatilis*); he does not indicate the exact locality. I have a photograph of a so-called cotype of *S. exigua* from Herb. P. consisting of a sterile branchlet. The label originally bore the inscription "*S. longifolia*, Missouri and Arkansas." The name *longifolia* has been crossed out, and in a similar handwriting is written "*exigua* Nutt." Judging by the serration and nervation of the leaves there can be no doubt that the specimen belongs to *S. longifolia*. I do not know of a true type specimen of *S. exigua*, but there can hardly be any doubt as to the form NUTTALL had in mind. From his phrase "capsulis lanceolatis sessilibus, demum nudiusculis" I infer that the typical *S. exigua* is a form with, at least in the beginning, hairy ovaries, but ROWLEE and other authors ascribe to it glabrous capsules. BALL (1909) is right in stating that it is "variable in foliage characters and sometimes very difficult to distinguish" from *S. longifolia*. In spite of having seen an abundant and well collected material, I am still at a loss how to define certain forms and to draw a sharp line between *S. exigua* on the one hand and such species as *S. longifolia*, *S. argophylla*, *S. Parishiana*, and also *S. taxifolia typica* on the other. From *S. longifolia* and its forms it differs chiefly in the opaque color of the canescent leaf-surfaces, bearing a more or less dense appressed tomentum of short silky hairs (especially on the young leaves) of a silvery hue. The leaves are usually smoother with a hardly visible nervation, but in old leaves (for instance in those of the southern form) the veins are sometimes rather well marked; their margin is mostly entire, but a dentation similar to that of *S. longifolia* may be observed in the southern forms. The fruiting aments usually are denser and the capsules as a whole shorter. *S. argophylla* chiefly differs, as previously stated, by its more villous tomentum, while *S. Parishiana*,

which cannot be distinguished by its pubescence, may be recognized by the longer lobes of the stigmas and the more or less distinct style. Male specimens of these species sometimes prove difficult to distinguish. In *S. sessilifolia leucodendroides* the base of the leaves usually is more obtuse and suddenly contracted in the very short petiole, while in *S. exigua* as well as in *S. Parishiana* the leaves are mostly attenuated at the base, passing gradually into the somewhat longer petioles. *S. Parishiana* normally has linear leaves, while in *S. exigua* they are more linear-lanceolate, but all those characters have to be taken cum grano salis. There is a specimen before me from southern New Mexico, Dona Ana County, Mesilla, alt. 1150 m., June 19, 1897, *E. O. Wooton* (no. 39, m.; G., St., W.), of which the younger leaves are almost sessile, with a pubescence like those of var. *leucodendroides*, but are more linear; the older ones, which are more glabrescent and measure up to 12 by 0.5 cm., have a distinct petiole 2–3 mm. long. The pubescence and shape of the bracts seem to vary in the same manner in every species. Whether or not the shape and size of the anthers afford a useful character I cannot state. In those regions where the species meet each other hybrid forms are certain to occur.

The range of what I call the typical form of *S. exigua* extends from southern Idaho (from which the type probably came) westward to Oregon (where the western line seems to run from about Wasco County to Klamath County) and Washington (where it hardly reaches the eastern slopes of the Cascades), northward to British Columbia (where I did not see it from farther north and west than Clinton on the Fraser River) and southern Alberta (Medicine Hat), eastward to central Montana and western Wyoming (Yellowstone Park), and southward to southeastern Nevada and southern California. In California it seems to occur along the eastern border line from Modoc to Inyo County (Panamint Range), and in the south (Ventura to San Bernardino, Imperial, and San Diego counties). There are also forms very near to it in San Benito, Tulare, and Kern counties, which partly point toward *S. sessilifolia* var. *Hindsiana*. From the south I also have seen forms which come very near var. *leucodendroides* on the one hand and *S. Parishiana* on the other. As already stated, the limitation of these species is a very difficult task.

In Nevada and Utah a form is found in which the female flowers have a ventral and a dorsal gland. To this form belongs *S. nevadensis* Wats., the type of which came from Nevada, Ormsby County, near Carson City. It is certainly not a good species, but I am inclined to keep it as a variety until it is proved by further observation that the presence of a dorsal gland is a character of no taxonomic value, and that no other character can be detected by studying the plant in the field. In proposing the name S. EXIGUA var. **nevadensis,** nov. var. (*S. nevadensis* Watson in Am. Nat. 7:302. 1873), I provisionally refer to it the following specimens, and wish to draw the attention of collectors to the localities mentioned. The type has glabrous ovaries, with a pedicel nearly as long as the ventral gland, while other forms with two glands have a more or less dense pubescence.

SPECIMENS EXAMINED.—Nevada: Ormsby County, at the base of the Washoe Mountains, near Carson City, alt. 1500 m., April 1868, *S. Watson* (no. 1093, f. type; G.); same region, 1865, *C. L. Anderson* (no. 196, m., fr.; G.; ovaria pilosa); Washoe County, Franktown Creek, May 18, 1907, *C. L. Brown* (no. 1677, f.; Reno); Glendale, alt. 1300 m., May 1, 1909, *P. B. Kennedy* (no. 1743, m.; G.); sloughs between Pyramid and Winnemucca lakes, alt. 1250 m., June 2, 1913, *P. B. Kennedy* (no. 1996, m., fr.; G.; forma quasi ad *S. sessilifoliam* var. *Hindsianam* accedens); Truckee River, alt. 1350 m., June 6, 1913, *P. B. Kennedy* (no. 2010, m., f.; G.); central Nevada, without exact locality, 1871, *Wheeler* (m.; syntype; G.).—California: Nevada County, along Coldstream, 3 miles above Truckee, July 17, 1913, *A. A. Heller* (no. 6953, fr.; forma aliquid incerta).—Utah: Washington County, St. George, alt. 600 m., April 9, 1880, *M. E. Jones* (no. 1644, m., f.; A., C.); without date, *E. Palmer* (no. 8, m., f.; M.); Redsand, alt. 900 m., April 24, 1894, *M. E. Jones* (no. 5117, m., f.; M.); Santa Clara, 1874, *C. C. Parry* (no. 8, m., f.; M.); Beaver County, Milford, along a stream, June 4, 1902, *L. N. Goodding* (no. 1018, fr.; W.); plains and mountains east of Milford, June 22, 1905, *P. A. Rydberg* and *E. C. Carlton* (no. 6318, fr.; G.); Salt Lake County, Salt Lake City, 1350 m., May 1869, *S. Watson* (no. 1091, fr.; G.); same place, May 12, 1880, *M. E. Jones* (no. 1710, m., f.; A., C.); Davis County, Lagoon, common, alt. 1500 m., July 7–8, 1901, *Pammel, Johnson, Buchanan,* and *Lummis* (fr. adult.; M.; probably var. *typica*).—Idaho: Bear Lake County, Montpelier, creek banks, May 20, 1910, *J. F. Macbride* (no. 207, f.; G.); Power County, north of Arbon, bridge over Bannock River, August 6, 1915, *C. R. Ball* (no. 2020, st.; G.; forma incerta).

There are also the following 2 specimens from southern California which resemble *S. exigua* and possess 2 glands in the female flowers: San Bernardino

County, Cushenberry[8] Spr[ing], Mojave Desert, June 2, 1901, *S. B. Parish* (no. 4931; N., St.), and Los Angeles County, Los Angeles, April 1901, *G. B. Grant* (no. 1156; M.; apparently the same as *Parish's* plant). Both need further observation.

In 1900 ROWLEE described a *S. exigua* var. *virens* (Bull. Torr. Bot. Club **27**:255), for the type of which a specimen collected by *Rothrock* in Arizona has to be taken. So far as can be discovered from the specimens cited by the author, I believe that ROWLEE mixed several forms of different affinity, belonging partly to *S. melanopsis Bolanderiana* (*Bolander*, no. 5031; *Kellogg* and *Harford*, no. 922; *W. G. Wright*, Kernville [not Kernerville]), and partly to *S. sessilifolia leucodendroides* (*Alderson* [not *Anderson*] no. 700). The type of *Rothrock*, which is sheet no. 6122 in C., represents a female specimen of which the flowers can hardly be distinguished from those of *S. exigua*. In the leaves it agrees well with a male specimen of *Orcutt's* (San Diego County, in the southwestern part of the Colorado Desert, Dos Cabesas, October 11, 1890, no. 2227; A., C.), which number is also cited by ROWLEE. Both may be taken for a rather glabrescent variety of *S. exigua*, but the leaves show under the lens a fine and thin silky pubescence and cannot be called "nearly glabrous," a character apparently taken by ROWLEE from the specimens of var. *Bolanderiana*. *Rothrock's* and *Orcutt's* specimens come very near the 2 specimens of *Parish* and *Grant* with 2 glands in the female flowers. Besides these there is *Parish's* no. 3194 (San Bernardino County, San Bernardino Mountains, Big Morongo, alt. 900 m., June 15, 1894; m.; M.) that hardly differs from *Orcutt's* plant, and also *LeRoy Abrams'* and *McGregor's* no. 406 (Los Angeles County, Liebre Mountains, Oakgrove Canyon and Elizabeth Lake, June 20–23, 1908; f., fr.; St.) seems to represent such a form the leaves of which become rather greenish at maturity, but the lower surface is rather glabrescent in *Rothrock's* specimens. This form somewhat simulates var. *Bolanderiana*, and I cannot express at present a definite opinion as to its real taxonomic value and true affinity.

[8] ROWLEE spells the name Cashewberry, but I read it as given, and S. B. PARISH writes in a letter to Professor C. S. SARGENT that this is the local way of spelling the name, while on the map of the Geological Survey it is spelled Cushenbury.

In Bot. Gaz. 65:25. 1918 I have made *S. stenophylla* Rydbg. a variety of *S. exigua*, referring to it the eastern and southeastern forms of this species. Rydberg's female type and male syntype came from southern Colorado, Huerfano County, Cuchara River, below La Veta (*Rydberg* and *Vreeland*, nos. 6393 f., 6392 m.; N.), and the ovaries are only partly glabrous, while most of the forms I take for var. *stenophylla* have wholly glabrous ovaries and fruits. The main character by which they differ from typical *S. exigua* is the longer pedicel, which in the fruit usually surpasses the gland in length. After all, even this character can scarcely be regarded as constant, and var. *stenophylla* is connected with the typical form by numerous intermediates. As a whole, however, the forms of *S. exigua* from Wyoming, Colorado, Arizona, New Mexico, Texas (Randall and El Paso counties), and probably also on the western border of Kansas, in northwestern Oklahoma, and in northern Mexico (northern Chihuahua), seem to present slight variations and may be called var. *stenophylla* until further studies in the field have led to a more proper understanding of the variability of this species. I suggested in Bot. Gaz. 65:25. 1918 that *S. Hindsiana* var. *tenuifolia* And. (in K. Sv. Vet.-Akad. Handl. 6:56. 1867) might be identical with var. *stenophylla*, in which case the name *tenuifolia* would have to be used. As type a specimen collected by *Burke* on the banks of the Snake River near Fort Hall in Idaho has to be taken. Judging by a photograph and fragments of the type preserved in Herb. K. I cannot decide whether the male specimen really belongs to what I call var. *stenophylla* or to the typical *S. exigua*. It comes from a region where both forms meet. The second specimen cited by Andersson "Nova Mexico (*Schur*)" is unknown to me, and may probably be referable to var. *stenophylla*, which name I prefer to keep so long as the identity of the Snake River form remains uncertain. To var. *stenophylla* also partly belongs as a synonym *S. longifolia* * * * *opaca* And. (in K. Sv. Vet.-Akad. Handl. 6:55. 1867) in so far as it refers to *Wright's* no. 1873, while *Berlandier's* no. 2341 represents *S. longifolia angustissima*.

In western Nebraska and northeastern Colorado another form of *S. exigua* has been found which somewhat reminds one of the f.

Wheeleri of *S. longifolia* (see following). RYDBERG described this form as *S. luteosericea* (in Britton, Man. 316. 1901) and kept the name in his Fl. Color. 94. 1906, while he makes it a synonym of his *S. exigua* in 1917 (Fl. Rocky Mts. 192), as BALL has already done in 1909. The type came from western Nebraska, Banner County. I think it best at present to keep this form separate under the name S. EXIGUA var. **luteosericea,** nov. var., and I provisionally refer the following specimens to it in the hope that collectors may pay attention to the localities mentioned and try to get a better understanding of this variety by studying it carefully in the field as to its association with typical *exigua* and with *S. longifolia*. I can hardly point out a good character by which to recognize this form, but its pubescence is a little more villose, and the aments are more loosely flowered than in typical *exigua* or var. *stenophylla*.

SPECIMENS EXAMINED.—Western Nebraska: Banner County, Lawrence Fork, July 8, 1891, *P. A. Rydberg* (no. 368 partim, f. type; N.); Kearney County, dry creek, June 13, 1891, *P. A. Rydberg* (no. 369, m. syntype; N.); Scotts Bluff County, Platte bottom, in Mitchell Valley, August 4, 1891, *P. A. Rydberg* (no. 368 partim, fr.; N.).—Colorado: Weld County, Greeley, July 23, 1896, *L. H. Pammel* (no. 200, fr., 201, m.; M.); Larimer County, without exact locality, plains, alt. 1500 m., June 26, 1895, *C. F. Baker* (*Patterson* no. 9842, m., f., rather typical, the male specimen almost identical with *exigua typica*); Fort Collins, near river, June 26, 1896, *L. H. Pammel* (no. 202, f.; M.); same locality, meadow near river, August 6, 1898 (Hb. Agr. Coll. Colo., no. 2343, fr.; C.); Morgan County, Fort Morgan, June 1896, *L. H. Pammel* (no. 204, st.; M.); Fremont County, Canyon City, banks of the Arkansas River, September 24, 1874, *G. Engelmann* (st., M.; vel var. *stenophylla*); Boulder County, August 1 [and 21 ?], 1884, July 20, 1885, *G. W. Letterman* (fr.; M.); Denver County, Denver, August 20, 1884, *G. W. Letterman* (fr.; M.).—S. Dakota: Butte County, Indian Creek, along flood plain, July 31, 1911, *S. S. Visher* (no. 2640, st.; C.; f. incerta); Bennett County, Little White River, valleys, August 15, 1911, *S. S. Visher* (no. 2274, st.; C.; rather uncertain, similar to *S. longifolia Wheeleri*).

There remains another form the proper interpretation of which raises many difficulties. It was described by HENDERSON as *S. longifolia tenerrima* from specimens collected by the author in Idaho, Elmore, and Canyon counties. At first sight it can hardly be distinguished from what I call *S. longifolia* var. *pedicellata* (see later), especially from such specimens as *Eastwood's* no. 465, but a

closer inspection shows that the leaves as a whole are narrower and the fruits shorter. In this respect it agrees more with *S. exigua*, of which it would represent an extremely glabrescent form. HELLER made it a species, and BALL evidently took the same view, as shown by his determinations of herbarium specimens before me, but RYDBERG (1917) quotes it as a synonym of his *S. linearifolia*, which is the same as var. *pedicellata* of *longifolia*. So far as I know the range of this peculiar form, it seems to be restricted to southwestern Idaho (region of Boise River), northwestern Wyoming (Yellowstone Park and northern Lincoln County), and adjacent southern Montana (Carbon and Big Horn counties). There is, to my present knowledge, no *S. longifolia* in this region, but it is within the range of *S. exigua*. I am therefore inclined to follow a suggestion of C. V. PIPER, with whom I have discussed this question, and to refer var. *tenerrima* as a variety to *S. exigua*.

S. EXIGUA var. **tenerrima,** nov. comb.—*S. longifolia* var. *tenerrima* Henderson in Bull. Torr. Bot. Club 27:354. 1900.—*S. tenerrima* Heller, Cat. N. Am. Pl. ed. 2. 4. 1900.—*S. fluviatilis* var. *tenerrima* Howell, Fl. N.W. Am. 618. 1902.—*S. linearifolia* Rydbg., Fl. Colo. 94. 1906, ex parte; Fl. Rocky Mts. 192. 1917 ex parte.—A typo praecipue differt foliis angustioribus linearibus etiam maximis vix ultra 4 mm. latis juvenilibus ut rami novelli parce breviter sericeis cito glabris vel pilis parcis difficile recognoscentibus vestitis utrinque satis viridibus vix nervatis vulgo pl.m. distincte denticulatis dentibus brevibus subglandulosis saepe satis distantibus, ovariis subsessilibus glabris, bracteis oblanceolatis tantum versus basim pilosis, fructibus vulgo pedicello distincto glandulam duplo superante instructis conico-rostratis pedicello excluso ad 6 mm. longis.

SPECIMENS EXAMINED.—Idaho: Elmore County, shady rocky banks of mountain rills gone dry, July 12, 1895, *L. F. Henderson* (fr., type; G.); Canyon County, Payette River, sandy bottoms, August 1, 1897, *L. F. Henderson* (fr.; G.); Falk's Store, open sandy slopes, alt. 660 m., May 24, 1910, *J. F. Macbride* (no. 98 m., fr. juv.; G., M., St.; "loose clumps").—Wyoming: Yellowstone Park, Soda Butte Creek, July 14, 1899, in small clumps on the stony river bottom, *A.* and *E. Nelson* (no. 5866, fr.; G., St.); Lincoln County, Jackson's Hole, banks of Gros Ventre River, July 14, 1901, *S. D. Merrill* and *E. N. Wilcox* (no. 996, fr.; G., M.; "10 ft.").—Montana: Big Horn County, Crow Agency,

August 30, 1871, *Coulter* (no. 5, st.; C.; forma porro observanda); Carbon County, near Red Lodge, July 28, 1893, *J. N. Rose* (no. 50, fr. adult.; forma aliquid incerta); Gallatin County, Bozeman, Gallatin River, low ground, October 4, 1905, *J. W. Blankinship* (no. 465, st.; A.; forma incerta ad *S. longifoliam pedicellatam* spectans); Rosebud County, Forsyth, north of town, toward river, 1908, *C. R. Ball* (no. 1305, st.; G.; "6 ft. high"; forma porro observanda).—Utah: Cache County, Logan Canyon, above Logan, August 8, 1914, *C. R. Ball* (no. 1864, fr.; W.; forma glabra pro *S. exigua* determinata, porro observanda).

This variety needs further observation in the field, and some of the specimens cited are uncertain owing to the lack of fertile material. Some forms of *S. longifolia pedicellata* are extremely alike, but the leaves show a more or less prominent (often very fine) venation, while in the leaves of var. *tenerrima* the lateral veinlets are scarcely visible and finely impressed; the fruits of both are sometimes almost identical, and I am not yet sure of the true affinity of var. *tenerrima*. *G. J. Jack*, August 16, 1918, collected on the Laramie River, Laramie, Albany County, Wyoming (no. 1017), sterile specimens of a form of which I am not sure whether it is var. *tenerrima* or var. *pedicellata*, neither of which has hitherto been reported from southeastern Wyoming. Professor JACK says: "Slender, coarse, grasslike, 2–3 ft. high, covering wide sandy areas," and he told me that it is a very distinct low form. There are now living plants in the Arnold Arboretum which I hope will prove useful in determining its real affinity.

There is still one form which needs a few words. It was collected by *S. M. Tracy* and *F. S. Earle* in western Texas, Jeff Davis County, Limpia Canyon, April 24, 1902 (no. 210, fr.; C., G.; distributed as "*S. longifolia opaca* Ands."), and it seems to be identical with Mexican specimens mentioned by me in BOT. GAZ. 65:23. 1918, under *S. taxifolia*. The habit and the leaves agree well with those of that species, but the fruits in no. 210 are much more like those of *S. exigua* with short sessile stigmas. It looks almost like a new species closely related to *S. exigua*, which seems to show a variability remarkable even among willows.

7. S. MELANOPSIS Nuttall, N. Am. Sylva 78. *pl. 21*. 1843; Rowlee in Bull. Torr. Bot. Club 27:256. *pl. 9, fig. 16*. 1900, pro parte; Piper and Beattie, Fl. Palouse Reg. Wash. 53. 1901; Piper in Contr. U.S.N. Herb. 11:213 (Fl. Wash.). 1906, pro parte; Ball

in Coult. and Nels., New Man. R. Mt. Bot. 131. 1909; in Piper and Beattie, Fl. Northw. Coast 114. 1915; Henry, Fl. S. Br. Col. 97. 1915; Rydberg, Fl. R. Mts. 192. 1917.—*S. longifolia* Bebb apud Coulter, Man. R. Mt. Bot. 335. 1885, pro parte, non Muhl.—*S. fluviatilis* Howell, Fl. Northw. Am. 1:618. 1902, pro parte, non Nutt.—This is a well marked species the type of which was found by NUTTALL "at our station called Fort Hall, in the plains of the Rocky Mountains, on alluvial lands of Lewis River of the Shoshonee." According to BALL (1909), this is old Fort Hall, near Pocatello, in Bannock County, eastern Idaho, south of the present Fort Hall,[9] near Blackfoot, in Bingham County. I have seen a photograph of a cotype preserved in Herb. P. BALL (1909) gives the range as follows: "Common in northeastern Oregon, eastern Washington, and British Columbia as far east as the Selkirks." I have not seen a specimen from the type region or other parts of southern Idaho, but only from northern Idaho, Montana (Teton County, Midvale, *L. M. Umbach*, no. 170), Alberta (Crow Nest Pass and Jasper), where it seems to reach its northern limit at about the 53d parallel, British Columbia (in the Chilliwack Valley and at Revelstoke), Washington (where I have seen it west of the Cascades only from King County, Snoqualmie), Oregon (where it was collected by *Ball* in 1915 as far west as the Umpqua River, Roseburg, Douglas County, and by *Applegate*, no. 2224, at Ashland, Jackson County), and northern and northeastern California (see below), where it seems to pass into var. *Bolanderiana*. According to BALL (BOT. GAZ. 60:45, first note, 1915), *S. Bolanderiana* is associated with *S. sessilifolia* at Roseburg and also farther north "on the Willamette River at Corvallis," Benton County. What I have seen from Oregon I take for the true *S. melanopsis*, which ought to be looked for also in northern Utah and in western Wyoming.[10] Its

[9] This locality, however, is identical with that given for Fort Hall in Lippincott's Geogr. Dict., ed. of 1855; while on the map in the Century Atlas of 1911 old Fort Hall is indicated south of the 43d parallel just north of Pocatello. Judging by Rand McNally's map the whole region between the two places is called Fort Hall.

[10] There is a specimen from eastern Wyoming, Converse County, Rawhide Creek, south of Patrick, August 27, 1901, *H. P. Baker* (m.; M.), which looks like typical *S. melanopsis*. In Herb. C. I found a specimen from Colorado, Clear Creek County, damp places along Clear Creek, 1885, *H. N. Patterson* (fr. adult. [sheets 5523 and 107801]), which clearly resembles *S. melanopsis*. I am not sure whether the localities given are correct.

occurrence so far north in Alberta is interesting. In the north a form with more hairy, almost shining silky leaves seems to be not infrequent (see *J. Macoun's* specimen from Lower Arrow Lake, no. 24569, O.). The species has usually been mistaken for *S. longifolia* or *S. fluviatilis*, but apparently it forms with the southern var. *Bolanderiana* a well marked type in this section, and I am not yet sure to which other group of it *S. melanopsis* is most closely related. BALL (BOT. GAZ. **60**:51. 1915) speaks of a "*S. fluviatilis-melanopsis*" aggregation in contrast with the *S. sessilifolia* group, but I think *S. melanopsis* has very little to do with the true *S. fluviatilis*. The specimens from Umatilla County, Oregon, western slope of the Blue Mountains, in a swampy meadow at Ukiah, June 24, 1908, *W. Cusick* (nos. 3260, 3261, fr. juv.; N., St.), need further observation. The young fruits show a short style and are almost sessile. The main characters of *S. melanopsis* may be gathered from the key. The species is not even mentioned by ANDERSSON (1858, 1867, 1868), and its identity has first been revealed by ROWLEE (1900), who erroneously states that "it is particularly abundant along the Columbia River where NUTTALL saw it." I have not seen all the specimens cited by ROWLEE, but those of *Coville*, from Washington, Cowlitz County, north fork of Lewis River, July 16, 1898 (no. 719, fr.; W.), which are not mentioned in PIPER'S *Flora* and which have leaves that measure up to 9:2.2 cm., seem not to represent typical *S. melanopsis*, and I have not yet been able to identify them properly. In Herb. C. are similar specimens collected by *W. N. Suksdorf* in W. Klickitat County, "rocky bank of the Larm River," July 17, 1884. After all they may be taken for a form of *S. melanopsis* with very broad leaves. In California *S. melanopsis* is mostly represented by the following variety:

7b. S. MELANOPSIS var. **Bolanderiana,** nov. var.—*S. longifolia* Bebb in Watson, Bot. Calif. **2**:84. 1879, pro parte, non Muhl.; Jepson, Fl. Calif. **2**:340. 1909, pro parte; in Mem. Univ. Calif. **2**:178 (Silva Calif.). 1910, pro parte.—*S. Bolanderiana* Rowlee in Bull. Torr. Bot. Club **27**:257, *pl. 9, fig. 12.* 1900.—*S. exigua* var. *virens* Rowlee, l.c. 255, *pl. 9, fig. 11.*—*S. argophylla* Rowlee, l.c. 252, quoad specim. *Bolanderii* (non *Breweri!*) no. 5031.—*S. fluviatilis* Eastwood, Handb. Trees Calif. 37. 1905, pro parte, non Nutt.; Sudw.,

For. Trees Calif. Slope 222. *fig. 91.* 1908, pro parte.—Of this variety ROWLEE has given a very incomplete description, and in citing the specimens he says "*Bolander*, nos. 49, 58, 4958, 5031." There are no nos. 49 and 58 of *Bolander*, but only no. 4958, which has to be taken for the type. No. 5031 is also cited by ROWLEE under *S. exigua* var. *virens*, of which I previously have spoken, and again under *S. argophylla* as a number of *Brewer*, who, so far as I know, never collected a specimen bearing the same number at the same locality from which *Bolander's* plant came.

This variety differs from the type chiefly by the characters indicated in the key. ROWLEE's statement in his key that in *S. melanopsis* the leaves are "distinctly glaucous and prominently veiny beneath" while they are "not distinctly glaucous nor veiny beneath" in *S. Bolanderiana* is not correct. The leaves are sometimes rather greenish beneath in both forms. The typical form of var. *Bolanderiana* is somewhat pubescent, while most of the specimens before me belong to a glabrous form. There can also be observed a slight variation with partly hairy ovaries and fruits in the specimens of *J. Burtt Davy* (no. 5691, from Hoopa Valley, Humboldt County, California) and *S. Watson* (no. 1092, Truckee Valley, Washoe County, Nevada). Both need further observation, and may represent hybrids with *S. exigua*. This seems also the case with *A. A. Heller's* no. 6953 (along Coldstream, 3 miles above Truckee, July 17, 1908). On the other hand, specimens collected at Sunol Valley, Alameda County, June 29, 1916, by *L. R. Abrams* (no. 5692, no. 5693, f.; St.), of which the male plant cannot be distinguished from typical var. *Bolanderiana*, possess ovaries and fruits which are hairy throughout or become glabrous only to a slight degree. They do not look like hybrids, and seem to represent a distinct form with pubescent ovaries and rather silky tomentose young leaves.

The typical *S. Bolanderiana* has rather broad leaves, but there are before me many very narrow leaved specimens, and further observation in the field must show whether the forms with linear-lanceolate leaves can be separated from the typical form. I do not wish to propose too many new varieties and forms which are only known to me from herbarium specimens, but I believe that a

closer study of many difficult forms which I can only briefly mention will lead to a different conception of them.

I have seen specimens of var. *Bolanderiana* from the following counties in California (north to south): Humboldt, Siskiyou (*A. A. Heller*, no. 8058, female part not quite typical), Shasta, Lassen, Plumas, Butte, Nevada, ?Mendocino (*A. Kellogg* and *W. G. W. Hartford*, no. 922, ?Ukiah), Lake, Solano, Alameda (Sunol), Amador, Tuolumne, Mariposa (*Bolander*, no. 4958, type!, Yosemite Park, Slough's Valley), Fresno, Monterey, Tulare, and Kern. It may even occur farther south.

There is a specimen from San Bernardino County, near head of San Antonio Canyon, in a narrow rocky canyon, alt. 2250 m., July 5, 1918, *I. M. Johnston* (no. 2087, flor. abnorm. m. et f. mixtis; A.; "shrub, low, under 1 m."). The leaves are almost wholly glabrous when maturing, at least on the lower surface, which is more or less distinctly glaucescent. The flowers, however, are abnormal, the female ones hard to distinguish from those of *S. exigua*, but glabrous, or almost so. The form may belong to *S. exigua virens*, if there is really such a variety, or it may be related to var. *Bolanderiana*. The normal form is represented by *Johnston's* nos. 1401 and 1665, from the upper San Antonio Canyon. I am much obliged to Mr. JOHNSTON for the following information:

Numbers 1401, 1665, 2087 from near head of San Antonio Canyon. To me this is the most interesting plant I sent you. I have thoroughly explored the San Antonio Mountains, but I have only found the single colony from which all my specimens were obtained. It grows as a dense, low, compact shrub (hardly over a meter in height) on the rocky floor of a very deep gulch. A short distance away is found a large colony of *S. flavescens* and scattering shrubs of *S. Watsoni*. The nearest LONGIFOLIAE that I know of is 7 miles away and is the colony from which my 1685, which you doubtfully referred to *S. Parishiana*, was obtained. I have never yet seen in S. California a LONGIFOLIAE so high in the mountains and associating with such typically boreal species as this one does. You have probably noted that the aments contain both staminate and pistillate flowers, which may be due to its strange habitat. I noted that a large percentage of the aments were entirely sterile at the time I collected the specimens.

8. S. LONGIFOLIA Muhl. in Neue Schr. Ges. Natf. Fr. Berlin 4:238. *pl. 6. fig. 6.* 1803, non Lamarck;[11] in Ann. Bot. König

[11] According to the international rules, MUHLENBERG's name can stand because LAMARCK's (Fl. Fr. 2:232. 1778) is nothing but a synonym of *S. viminalis* L.; in following the Philadelphia Code the name *S. interior* Rowl. has to be used, and I would not keep MUHLENBERG's name if LAMARCK's were not an unconditional synonym, and could be applied to a form differing from typical *S. viminalis*.

2:66. *pl. 5. fig. 6.* 1806; Carey in Gray, Man. Bot. N.U.S. 429. 1848; Andersson in K. Sv. Vet.-Akad. Handl. 6:54. *pl. 4. fig. 35.* 1867, pro parte et excl. var.; in DC., Prodr. 16²:214. 1868, pro parte et excl. var.; Bebb in Coult., Man. Bot. R. Mts. 335. 1885, pro parte; apud Watson and Coulter, Gray Man. ed. 6. 482. 1890; Robinson and Fernald, Gray's New Man. 323. *fig. 649.* 1908.—*S. fluviatilis* Sargent in Gard. and For. 8:463. 1895, pro parte, non Nutt.; Silva N. Am. 9:123. *pl. 474.* 1896, pro parte et excl. var.; Man. Trees N. Am. 175. 1905, pro parte; Schneider, Ill. Handb. Laubh. I. 32, *figs. 11 h–l, 12 m–m¹.* 1904; Ball in Proc. Iowa Ac. Sci. 7:145. 1900; in Coult. and Nels., N. Man. R. Mts. Bot. 131. 1909, pro parte; in Bot. Gaz. 60:397. 1915; Britt. and Brown, Ill. Fl. 1:497. *fig. 1181.* 1896; Sudworth, Nomencl. Arb. Fl. U.S. 122. 1897, pro parte; Rydberg in Britt., Man. Fl. N. St. Can. 316. 1901; Hough, Handb. Trees N. St. Can. 84. *figs. 97, 98.* 1907, pro parte maxima.—*S. interior* Rowlee in Bull. Torr. Bot. Club 27:253. *pl. 9, figs. 12, 13.* 1900; Small, Fl. S.E.U.S. 342. 1903, pro parte; Britt. and Shafer, N. Am. Trees 193. *fig. 154.* 1908; Britt. and Brown, Ill. Fl. ed. 2. 1:595. *fig. 1458.* 1913; Rydberg, Fl. R. Mts. 192. 1917.—This is the type species of the section and the only one known from the central and northeastern states and eastern Canada. The type came from Lancaster, Pennsylvania. It has its headquarters in the regions of the Mississippi, Arkansas, and Missouri, while toward the east the Ohio seems to form the southern border line of its range up to Pennsylvania. The mouth of the Mississippi in Louisiana is the southernmost point of the range of *S. longifolia;* its western boundary runs apparently just south of the Red River in Louisiana and Texas, thence through western Kansas, the northeastern corner of Colorado, touching Wyoming in its northeastern part, from whence it runs through western Dakota to Manitoba. In Texas, southern New Mexico, and northwestern Mexico it is represented by var. *angustissima* (see later), while in the northwest from western Dakota and northeastern Wyoming through eastern Montana, Saskatchewan, and eastern Alberta the var. *pedicellata* seems to be the prevailing form, reaching its northwestern limit in the Yukon Valley (vicinity of Dawson and the adjacent parts of eastern Alaska, Fairbanks) and the upper Mackenzie region in the

Northwest Territories. The northern border line of the range of *S. longifolia* and var. *pedicellata* is not yet exactly known. Approximately it seems to run in the west from Fairbanks in Alaska to Fort Simpson in the Northwest Territories and through the Athabasca Plains and central (or southern?) Manitoba and southern Ontario to the south of James Bay and to about Lake St. Johns in Quebec, from where the eastern line turns southeast to western New Brunswick (Woodstock, Pokiok) and then southward to New Hampshire along the Connecticut River to Delaware and the District of Columbia.

The species apparently reaches its best development in the rich river bottoms from Louisiana to Indiana, while in Oklahoma, Kansas, Nebraska, and Iowa the form of the sand bars seems to prevail, which has narrower, smaller leaves. In the region of the Great Lakes and in the northeast, but also in other portions of the range under similar ecological conditions, the following variety seems to occur frequently:

S. LONGIFOLIA var. **Wheeleri,** nov. comb.—*S. interior* var. *Wheeleri* Rowlee in Bull. Torr. Bot. Club **27**:253, *pl. 9, fig. 14.* 1900. —*S. Wheeleri* Rydberg in Britt., Man. ed. 2. 1061. 1905; Britt. and Br., Ill. Fl. ed. 2. **1**:595. 1913.—*S. longifolia* (vel *S. fluviatilis*) var. *argyrophylla* Auct. div. pro parte, non And.—I agree to a certain extent with SCHAFFNER (in Ohio Nat. **14**:255. 1914), who regards this variety as an ecological form, and I have already pointed out that similar forms seem to occur in *S. exigua* (see var. *luteo-sericea*), *S. melanopsis* var. *Bolanderiana*, etc. Those forms very often look quite distinct, especially in the herbarium. The broad leaved forms of var. *Wheeleri* can easily be taken for a well marked species if one does not have a very rich set of specimens showing all the intermediates between such forms as we know from Maine (Caribou) and New Brunswick and the narrow leaved forms from Lake Champlain, Lake Superior, etc. It may be that the easternmost forms are not quite identical with the typical var. *Wheeleri* from the region of the Great Lakes, but to decide this question we need a careful study of this form as it is observed in New Brunswick, Maine, Connecticut, western Quebec, and eastern Ontario. There is a male plant in cultivation in the Arnold

Arboretum which was brought by Professor *J. G. Jack* probably from the St. Lawrence region in Ontario. It is extremely like the female specimen of *Bissell* from Glastonbury, Connecticut, and both agree well with the specimens cited from Maine and New Brunswick. In *Bissell's* plant the stigmas are rather long and narrow, resembling somewhat those of the western *S. fluviatilis* but without a trace of a style. The leaves too of both plants are not very different in their shape, but var. *Wheeleri* has a coarser silky pubescence of longer hairs. ROWLEE stated that "the silvery vesture of this shrub is much like that of *S. argophylla* of the Pacific Coast." As I have explained under this species, ROWLEE did not interpret it correctly.

At present I refer to var. *Wheeleri* the following specimens, and I hope collectors will pay attention to this plant at the localities given.

Eastern North Dakota: Benson County, Pleasant Lake, 99 mer., everywhere along watercourses, July 2, 1911, *J. Lunell* (m., flor. satis abnorm.; A.).—Iowa: Story County, Ames, 1888, *A. S. Hitchcock* (m.; M.); Fremont County, Hamburg, July 4, 1914, *L. H. Pammel* and *H. B. Clarke* (no. 44, m.; A.; a hairy sand-bar form).—Illinois: St. Clair County, Cahokia, July 23, 1895, *N. M. Glatfelder* (m.; M.); Winnebago County, Fountaindale, 1877, *M. S. Bebb*, (fr.; M.; narrow leaved form, probably cultivated); Cook County, Dunning, fields, May 16, 1916, *F. C. Gates* (no. 1428, m.; C.).—Indiana: Noble County, near Rome City, June 11, 1916, *Deam* (no. 20118 A, ex parte, f., fr.; A.); Union County, Liberty, July 1886, *J. N. Rose* (st.; C).—Michigan: Wayne County, Belle Isle, July 8, 1903, *D. A. Farwell* (f.; A.; according to a letter of FARWELL this form was named by ROWLEE himself var. *Wheeleri*, but it represents a very glabrescent form difficult to separate from typical *longifolia*).—Wisconsin: Brown County, Green Bay, south shore, June 1878, *J. H. Schuette* (m., st.; C.).—Minnesota: Buffalo Lake, June 1891, *B. C. Taylor*, (m.; C.).—Ohio: Erie County, Cedar Point, August 2, 1895, *E. L. Moseley* (st.; G.); September 4, 1898, *Moseley* (st.; W.; folia ad 8:2 m. magna, elliptico-oblonga); July 3, 1908, *R. F. Griggs* (no. 2, m.; N.; folia ad 8:1.5 cm. magna, distanter ciliato-serrata); without exact locality and date, *W. S. Sullivant* (no. 49, st.; N.); Lake County, near Painesville, May 19, 1892, *O. Hacker* (no. 431, m.; C.); Franklin County, Columbus, 1840, *W. S. S.* (st.; G.); Ottawa County, Bay Point, sandy shore, August 20, 1914, *L. H. MacDaniels* and *A. J. Eames* (fr.); Ross County, Chillicothe, June 16, 1899, *A. D. Selby* (no. 120, st.; C.).—Pennsylvania: Erie County, Presque Isle, Lake Erie, July 23, 1868, *T. C. Porter* (st.; N., C.); York County, shores of the Susquehanna near

McCall's Ferry, September 13, 1864, *T. C. Porter* (m.; C.; "shrub 5–6 ft. high"; forma peculiaris foliis late oblongo-ellipticis ad 9:2.2 cm. magnis).—New York: Erie County, shores of Lake Erie near Buffalo, June 30, 1899, *J. F. Cowell* (st.; N.); Clinton County, shore of Lake Champlain, near Plattsburg, August 8, 1902, *A. Rehder* (st.; A.); Tompkins County, Fall Creek ravine, on rocks, May 29, June 6, 1885, *W. R. Dudley* (m., st.; C.; folia pl.m. oblanceolata).—Vermont: wet shore of Lake Champlain, July 8, 1914, *Ch. H. Knowlton* (m.; NE.); June 15, 1896, *A. J. Grout* (f.; NE.; stigmata satis elongata).—Connecticut: Hartford County, Glastonbury, banks of Connecticut River, May 18, 1902, *C. H. Bissell* (f.; G.; "small shrub"; forma distincta porro observanda); New London County, Lyme, near Selden's Cove, July 29, 1902, *C. B. Graves* (st.; G.; "2 ft. high"; ut praecedens).—Maine: Aroostook County, Caribou, gravelly river beach, July 18, 1902, *E. F. Williams*, *J. F. Collins*, and *M. L. Fernald* (st.; G.; forma satis distincta porro observanda); same locality and date, *E. F. Williams* (st.; A., G.).—New Brunswick: Woodstock, on the bars in the St. John River, August 30, 1899, *Macoun* (no. 22609, O.; st.; very much like the Connecticut forms); near Pokiok, July 8, 1889, *Brittain* (no. 24577, O.; st.; ut praecedens); above Fredericton, on island, August 23, 1890, *J. Brittain* (no. 6, fr.; C.; ut praecedens); Keswick, June 6, 1891, *J. Brittain* (no. 4, f.; C.).—Ontario: Lambton County, Fort Frank, 35 miles from Port Huron, Michigan, July 21, 1905, *C. K. Dodge* (st.; A.; forma densissime sericea); Welland County, Point Albino, August 28, 1896, *C. L. Pollard* (st.; W.); James Bay, Moose Factory, July 15, 1904, *W. Spreadborough* (no. 6262e, O.; st.; forma porro observanda paullo sericea).

Every species inhabiting such a wide area as *S. longifolia* and growing under so many different ecological conditions will naturally show a great degree of variability. Besides this there are quasi intermediate forms with *S. exigua* in all the regions where both species meet, and it is difficult to decide whether the northwestern forms of what I call var. *pedicellata* really belong to *S. longifolia* or to *S. exigua*, as BALL seems to believe according to his determinations in different herbaria. The synonymy of var. *pedicellata* may be given as follows:

8b. S. LONGIFOLIA var. PEDICELLATA Andersson in K. Sv. Vet.-Akad. Handl. **6**:55. 1867; in DC., Prodr. **16**²:214. 1868.—*S. rubra* Richardson in Franklin, Narr. Jour. Polar Sea App. 752. 1823, nom. nud., non Hudson.—*S. longifolia* (?) Torrey in Ann. Lyc. Nat. Hist. N.Y. **2**:248 (Coll. Pl. R. Mts. James).[12] 1828; Andersson in

[12] The specimen (preserved in N.) has been collected by *James* either in eastern Wyoming or eastern Colorado, and seems to belong to this variety.

Öfv. K. Vet.-Akad. Förh. **15**:116. 1858, ex parte; Macoun, Cat. Canad. Pl. 450. 1883, ex parte; Sargent, Rep. For. Trees N. Am. 10th Census U.S. **9**:168. 1884, ex parte.—*S. fluviatilis* Sargent in Gard. and For. **8**:463. 1895, ex parte, non Nutt.; Rowlee in Bull. Torr. Bot. Club **27**:254. 1900, ex parte; Henry, Fl. S. Br. Col. 97. 1915.—*S. interior* Rowlee, l.c., 253, ex parte; Britt. and Br., Ill. Fl. **1**:595. 1913, ex parte.—*S. linearifolia* Rydbg. in Britton, Man. 316. 1901; Fl. Color. 94. 1906, ex parte; Fl. R. Mts. 192. 1917, ex parte; Small, Fl. S.E.U.S. 342. 1903, ex parte.—*S. longifolia* var. *interior* Jones, Willow Fam. 25. 1908, ex parte.—I have seen a photograph and fragments of the type of var. *pedicellata*, collected by *E. Bourgeau*, "Saskatchewan bords des Lacs, abondant, 21 Juin 1858" and preserved in Herb. K., and also of the type of *S. rubra* Rich. from the "Mackenzie River." This specimen of *Richardson's* represents the same form as the material from "Cumberland House" in Saskatchewan, which is a syntype of *S. linearifolia* Rydbg. in Herb. N. This variety differs from typical *S. longifolia* chiefly in its narrower, linear leaves, and its glabrous ovaries, which are more or less sessile when young but usually distinctly pediceled when in fruit, the pedicels often being twice as long as the ventral gland. As previously stated, var. *pedicellata* is the prevailing form in the northwestern part of the range of *S. longifolia*, but there are also forms near the southern limit of its habitat which can hardly be distinguished from var. *pedicellata* (for instance *Munson's* specimens from the Red River near Colbert's Ferry, north of Denison, Texas, April 19, 1911, f., fr.; A.).

As previously stated, the most southern form of *S. longifolia* is represented by var. *angustissima* And. (1858[13]) with which I have dealt in Bot. Gaz. **65**:26. 1918. Besides the Mexican specimens here cited, I refer the following to this variety, which seems too closely connected with the typical *S. longifolia* to be kept as a distinct species.

Specimens examined.—Texas: without exact locality and date, *Berlandier* (nos. 911, 2341, 2368, 3019, cotypes; G., M.; 1938, f.; M.; nos. 2341 and

[13] Later, in Monogr. 1867 and in Prodr. 1868, Andersson used this name for different forms, partly belonging to *S. sessilifolia* var. *Hindsiana*, partly to *S. exigua* (probably var. *stenophylla*).

2368, of which the last has to be taken as the type of *S. Thurberi*, have been erroneously attributed by ROWLEE to *G. Thurber*, to whom only the following specimen belongs); Horse Head Cruping (?) River, October 1850, *G. Thurber* (no. 95; G.; "10–12 ft."); ?Pecos County, banks of the Pecos, 1889, *Nealhy* (no. 33, m.; W.); September 1881, *V. Havard* (m., f.; W.; ad var. *typicam* accedens); Brewster County, Rio Grande, south of Chisos Mountains, August 1883, *V. Havard* (m., f.; W.); Val Verde County, Del Rio, along streams, October 18, 1916, *E. J. Palmer* (no. 11069, f.; A.); Potter County, Amarillo, creek banks, July 13, 1917, *E. J. Palmer* (no. 12539, f., fr.; A.; ad var. typicam accedens); along Rio Grande, near San Vincente, August 26, 1915, *M. S. Young* (m., f.; M.); Guadalupe County, in the dry bed of the Cibolo 12 miles east of New Braunfels, August 1851, *F. Lindheimer* (no. 615 [=1191], f.; G., M.); Comanche County, Comanche Spring, *Lindheimer* (no. 1190, f.; M.); Matagorda County, banks of Peyton Creek near Bay City, May 6, 1916, *E. J. Palmer* (no. 9689, m.; A.); Cameron County, near Brownsville, November 1888, *Nealhy* (no. 30, f., fr.; W.); (New Mexico?), Rio Grande, July 1848, *C. Wright* (m.; G.; "small tree"); without locality, 1849, *C. Wright* (no. 668, m.; G., W.).

There have also been described the following forms which I have not yet been able to elucidate: *S. longifolia* var. *sericans* Nees v. Esenbeck in Wied-Neuwied, Reise In. N. Am. 2:448. 1841; Engl. ed. by Lloyd, Trav. Int. N.A. 518. 1843, collected on the Missouri, probably in eastern Montana about July 8 (see *l.c.* 1:472 [Engl. ed. p. 211]). I would refer it to *S. exigua*, but the lower flowers of the male aments are described as "triandri"; otherwise the description agrees with *S. exigua*.—*S. longifolia* f. *integerrima* Kuntze, Rev. Gen. Pl. 2:643. 1891, and f. *paucidenticulata* Kuntze, l.c. The first is characterized by the phrase "folia denticulata" and as type is given "U. St., Madisonthal"; while the second has "folia paucidenticulata" and came from "Cheyenne, Nebr." The author adds "Ausserdem kann man eine f. *multidenticulata* unterscheiden." I suppose those forms are simply typical *S. longifolia*.

With the hybrids which doubtless occur only too frequently where different species grow together it is impossible to deal, as long as it has not yet been possible to limit the species in a more satisfactory manner. The main purpose of this paper is to point out the correct application of certain names, and to direct attention to such forms as need a close study in the field.

ARNOLD ARBORETUM
JAMAICA PLAIN, MASS.